REMARKS

Claims 1-22 are now pending in the application. New claims 23-25 are added, support for which may be found in the specification as originally filed at paragraphs 5, 14, and 15.

In summary, Yamaguchi et al. merely teaches adjusting speech models to new noisy conditions. While, Applicant's claimed invention does temporarily adjust speech models to new noisy conditions when obtaining features from the new speech, it then transforms the features to the training noise conditions and performs speaker adaptation on the original speech models. These speaker adapted speech models can later be adjusted to any noise conditions and used to recognize speech of the enrolling user. They can also be adjusted and used to extract improved features, which can be further transformed to the training noise conditions, and used to adapt the original speech models to the new speaker again. This process can be performed iteratively. In contrast, if the adjusted speech models of Yamaguchi et al. were adapted using non-adjusted, extracted features, and even if the new noisy conditions were recorded so that the adjusted and adapted speech models could later be adjusted to future noise conditions, then the overall adjustment and speaker adaptation would be inferior, and iterative adjustment and speaker adaptation in this manner would compound this inferiority.

The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 102

Claims 1-22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yamaguchi et al. (U.S. Pat. No. 6,026,359). This rejection is respectfully traversed.

Yamaguchi et al. is generally directed to adaptation of a noisy HMM to a new noisy HMM based on new noisy conditions and knowledge of previous noisy conditions. For example, the Abstract states, "the probabilistic models are adapted by obtaining a model parameter after a condition change by updating a model parameter before a condition change according to the determined change". Also, each of Figures 4, 6, and 7 illustrate that an HMM is adapted based on observed background noise before speech to be recognized is even obtained. Thus, a trained HMM is adapted to new noisy conditions and used to recognize speech of a new user. However, Yamaguchi et al. does not teach transforming features extracted from new speech under new noisy conditions into features that might have been obtained under training noise conditions, and then, in a speaker adaptation process, adapting speech models trained under the training noise conditions with the transformed features.

The Examiner mistakenly references Figures 1 and 2 and column 1, lines 27-33 of Yamaguchi et al. to teach transformation of extracted features to old nosy conditions followed by speaker adaptation of the speech models. However, the cited Figures merely teach adapting speech models trained under old noisy conditions to new noisy conditions. Similarly, the cited text merely mentions that change in speaker and vocal tract length, in addition to noise, can also cause a mismatch. This statement can not be perceived as teaching speaker adaptation, even of speech models adjusted to new noise conditions. Moreover, even if one were to perform speaker adaptation on the

adjusted speech models of Yamaguchi et al., one would acquire speaker adapted and noise adjusted speech models that can only work under the new noise conditions, especially where Yamaguchi et al. fails to teach obtaining and keeping a new model of the new noise conditions for use in subsequent adjustment of the speaker adapted models to future noise conditions.

Applicant's claimed invention is directed toward speaker adaptation of trained speech models. In particular, Applicant's claimed invention is directed to transformation of features extracted from speech of an enrolling speaker into features compatible with training noise conditions, and use of the transformed features to perform speaker adaptation on speech models trained under the training noise conditions. As part of this process, Applicant's claimed invention does temporarily adjust speech models to new noisy conditions when obtaining the features from the new speech, but then transforms the features to the training noise conditions and performs speaker adaptation on the original speech models. These speaker adapted speech models can later be adjusted to any noise conditions and used to recognize speech of the enrolling user. They can also be adjusted and used to extract improved features, which can be further transformed to the training noise conditions, and used to adapt the original speech models to the new speaker again. This process can be performed iteratively. In contrast, if the noise adjusted speech models of Yamaguchi et al. were adapted using non-adjusted, extracted features, and even if the new noisy conditions were recorded so that the adjusted and adapted speech models could later be adjusted to future noise conditions, then the overall adjustment and speaker adaptation would be inferior.

Iterative adjustment and speaker adaptation in this manner would compound this inferiority.

Applicant's claimed invention teaches a speaker adaptation process that utilizes adjustment of speech models to new noise conditions as only one part of the process for feature extraction (as detailed at paragraph 12 of the originally filed specification), followed by novel process steps that include transformation of extracted features to training noise conditions, and speaker adaptation of the original speech models based on the transformed features. In particular, independent claim 1 recites:

> obtaining input speech under second environmental conditions from a speaker for whom the speech models are to be adapted and extracting observation data from said input speech; decoding said observation data to ascertain state segmentation data associated with said observation data; providing a linear approximation operator that embeds a priori knowledge of said first environmental conditions; operating upon said observation data using said linear approximation operator and said state segmentation data to transform said observation data into compensated observation data that approximates the observation data under said first environmental conditions; applying a speaker adaptation operation upon said compensated observation data to generate adapted speech models for said speaker.

Thus, Yamaguchi et al. fails to teach all of the subject matter recited in independent claim 1. Independent claim 12 recites similar subject matter. Applicant further directs the Examiner to new claims 23-25, which are fully supported in the Specification as originally filed at paragraphs 5, 14, and 15.

Applicant respectfully requests the Examiner withdraw the rejection of independent claims 1 and 12 under 35 U.S.C. § 102(b) on these grounds, along with rejection on these grounds of all claims dependent therefrom.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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